

## CLAIMS

That which is claimed is:

1. A transabdominal access system for a patient having a heart, a rib cage, a sternal area and an abdomen with an upper abdominal incision, comprising:  
    spreader portions, said spreader portions being positioned relative to each other to open the incision and produce a substernal space for access to the heart by lifting the sternal area and depressing the abdomen at the incision.
2. The system of claim 1, further comprising compression surfaces, said compression surfaces positioned across the rib cage when in use for compressing the rib cage to assist in producing the substernal space.
3. A transabdominal access system for a patient having a heart, a rib cage with opposite sides, a sternal area and an abdominal area with an upper abdominal incision, comprising:  
    a first spreader portion, and compression surfaces, said first spreader portion and said compression surfaces positioned relative to each other for said spreader portion to contact the sternal area and said compression surfaces to contact opposite sides of the rib cage, said system adapted to retract said sternal portion and compress said ribs to produce a substernal space for access to the heart.
4. The system of claim 3, further comprising a second spreader portion, said second spreader portion adapted to depress the abdomen at the incision.
5. The system of claim 4, wherein said first spreader portion and said second spreader portion are positioned relative to each other to open the incision and produce a substernal space for access to the heart by simultaneously lifting the sternal area and depressing the abdomen at the incision.
6. A method for providing transabdominal access for cardiac surgery in a patient having a heart, a rib cage with opposite sides, a sternal area and an abdominal area, comprising:  
    producing an incision in the upper abdominal area;

holding open said incision by lifting the sternal area and depressing the abdomen at the incision to produce a substernal space for access to the heart.

7. The method of claim 6, further comprising retracting the sternal area.

8. The method of claim 6, further comprising compressing the opposite sides of the rib cage to increase the substernal space for access to the heart.

9. A method for providing transabdominal access for cardiac surgery in a patient having a heart, a rib cage with opposite sides, a sternal area and an abdominal area, comprising:

producing an incision in the upper abdominal area;

holding open said incision by lifting the sternal area and compressing the opposite sides of the rib cage to produce a substernal space for access to the heart.

10. The method of claim 9, further comprising depressing the abdomen at the incision to increase the substernal space for access to the heart.

11. A transabdominal access system for a patient having an upper abdominal incision, comprising:

an upper spreader portion and a lower spreader portion, said upper spreader portion configured for lifting the sternal area of the patient at the incision and said lower spreader portion configured to depress the abdomen at the incision; and

said upper and lower spreader portions being positioned relative to each other to produce a substernal space.

12. The transabdominal access system of claim 11, wherein said lower spreader portion comprises a depressor portion, said depressor portion having a depressor surface which contacts the abdomen at the incision.

13. The transabdominal access system of claim 11, wherein said upper spreader portion comprises a lifting surface for lifting the sternal area of the patient; and

said lifting surface comprises at least one hook contacting the sternal area of the incision.

14. The transabdominal access system of claim 11, further comprising:

a first and second side portion, said first and second side portions are positioned and configured between said upper spreader portion and lower spreader portion to aid in producing a substernal space.

15. The transabdominal access system of claim 14, wherein said first and second side portions are integrally connected to said upper spreader portion and said lower spreader portion of said system.

16. The transabdominal access system of claim 14, where said first and second side portions are connected to said upper spreader portion; and

said side portions comprise a rib compression surface, said rib compression surface positioned across the rib cage when in use for compressing the rib cage to assist in producing the substernal space.

17. The transabdominal access system of claim 16, wherein said rib compression surfaces of said side portions each comprise at least one adjustable compression pad configured to contact the patient to apply an external force to the patient's rib cage.

18. The transabdominal access system of claim 17, wherein said upper spreader portion and said compression pads are configured to coordinate sternal lifting by said upper spreader portion and rib compression by said compression pads.

19. The transabdominal access system of claim 11, further comprising:

contact pads configured to stabilize said transabdominal through contact with the patient in locations away from the substernal opening.

said upper spreader portion comprises a lifting portion for lifting and retracting the patient's sternum.

20. The transabdominal access system of claim 11, wherein said upper spreader portion further comprises a retraction mechanism adapted to lift the rib cage at the site of the abdominal opening.

21. The access system of claim 21, wherein said retraction mechanism comprises a ratchet mechanism adapted to generate a force necessary to lift the sternum and maintain a lifted position of the sternum.

22. The transabdominal access system of claim 11, wherein said upper spreader portion further comprises a screw-type mechanism for lifting and retracting the sternum.

23. The transabdominal access system of claim 20, wherein said retraction mechanism comprises a piston driver.

24. The transabdominal access system of claim 20, wherein said retraction mechanism comprises a hoist.

25. The transabdominal access system of claim 20, wherein said retraction mechanism comprises a winch-type mechanism.

26. The transabdominal access system of claim 11, wherein said system is configured and mounted to a surgery table for stability of said system.

27. The transabdominal access system of claim 11, wherein said upper spreader portion further comprises a plurality of cables, said plurality of cables configured to run through the patient's chest to lift the sternal area.

28. The transabdominal access system of claim 11, wherein said lower spreader portion further comprises at least one instrument mounting element for a tool useful in surgery.

29. The transabdominal access system of claim 11, wherein said upper spreader portion comprises a lifting portion and a pair of advancement mechanisms and compression

plates, said advancement mechanisms configured to adjust positions of said compression plates relative to said lifting portion.

30. The transabdominal access system of claim 29, wherein said advancement mechanisms comprise a plurality of lugs and a horizontal slider, said plurality of lugs being adjustable along said horizontal slider to optimize the placement of said compression plates relative to said lifting portion of said upper spreader portion.

31. A transabdominal access system for a patient having an upper abdominal incision, said system comprising:

a retractor portion configured to provide a tensile force to a sternal area of the patient;  
and

a compression portion configured to apply a compressive force to the ribs of the patient, wherein said tensile force and said compressive force are applied together to enhance a substernal opening in the patient.

32. The transabdominal access system of claim 31, wherein said retractor portion and said compression portion are linked for coordinated application of said tensile and compressive forces.

33. The transabdominal access system of claim 32, wherein said retractor portion and said compressive portion are linked by first and second linkage assemblies, said linkage assemblies configured to be symmetrical to one another.

34. The transabdominal access system of claim 33, wherein each said linkage assembly comprises a first linkage member and a second linkage member, said first linkage member and said second linkage member being pivotally coupled to form a linkage.

35. The transabdominal access system of claim 34, wherein each said linkage assembly further comprises a third linkage member, and said second linkage member has a first end coupled to said first linkage member and a second end which is pivotally coupled to said third linkage member.

36. The transabdominal access system of claim 35, wherein each said linkage assembly further comprises a forth linkage member, said forth linkage member pivotally coupled to said second linkage member.

37. The transabdominal access system of claim 36, wherein each said linkage assembly further comprises a movable lever arm which is fixedly coupled to said forth linkage member.

38. The transabdominal access system of claim 31, wherein said retractor portion comprises a main body member operatively configured to a hook member adapted to lift the sternum region of the patient.

39. The transabdominal access system of claim 33, wherein said retractor portion comprises a main body member operatively configured to a hook member adapted to lift the sternum region of the patient, wherein said compression portion includes a pair of compression pads adapted to apply said compressive force to the ribs, and wherein said main body member is pivotally coupled to both said linkage assemblies to allow for even rib compression from said compression pads and simultaneous lifting by said hook.

40. The transabdominal access system of claim 36, wherein said retractor portion comprises a main body member operatively configured to a hook member adapted to lift the sternum region of the patient, wherein said forth linkage member is pivotally coupled to said main body member in a fixed location; and wherein lifting or lowering of said main body member allows the coordinated movement of said third and forth linkage members.

41. The transabdominal access system of claim 39, further comprising a rack-type mechanism operatively connected to said main body and said linkage assemblies for adjusting rib compression and sternal lifting.

42. The transabdominal access system of claim 41, wherein said rack-type mechanism comprises a rack, a lever arm, a first side and a second side, where said first side is configured

to be movable over said rack relative to said second side; and said lever arm is configured to lock said first and said second side of said rack-type mechanism into a desired position.

43. The transabdominal access system of claim 31, further comprising a depressor mechanism configured to depress an abdominal area of a patient, thereby further enhancing the substernal opening.